construction of important new works, he succeeded to the position of acting engineer-in-chief, and became engineer-in-chief in 1898. He resigned this post in 1913, and then became a partner in the firm of Sir J. Wolfe Barry and Partners, but remained consulting engineer to the Mersey Dock Board until the time of his death. Mr. Lyster became a member of the Institution of Civil Engineers in 1882, and was president in 1914. He served as a member of the International Technical Commission for the Suez Canal, and was consulted with regard to improvements of the harbours at New York, Bombay, Port Elizabeth, Shanghai, etc. He was also a member of the Admiralty Committee on Naval Works at Doon and Rosyth, and associate professor of engineering at Liverpool University.

By the death of Mr. W. A. E. Ussher, which occurred on March 19, many British geologists will lose an old friend who, whether in his usual mood of breezy optimism, or in a rarer phase of boisterous pessimism, was always good company. Mr. Ussher joined the Geological Survey in 1868 and was engaged in the mapping of various parts of England, but his name will always be associated with the Devonian, Carboniferous, and New Red rocks of Devon, Cornwall, and Somerset, where he spent most of his official career. His principal contributions to the literature of these formations appear in the Memoirs of the Geological Survey, in the Journal of the Geological Society, and in the Transactions of the Devonshire Association. In his study of the West Country rocks it was his constant endeavour to secure correlation with their European equivalents, and thus he was brought into close association with many Continental geologists of note. In 1914 he was awarded the Murchison medal of the Geological Society in recognition of his labours. Mr. Ussher retired from the Survey in 1909; unfortunately, ill-health since then kept him in almost complete retirement.

By the comparatively early death of Dr. R. C. Maclaurin on January 15 last, the United States have lost an accomplished and energetic immigrant. Dr. Maclaurin was born at Lindean, Scotland, in 1870, and in 1897 was placed in the first division of the first class of the advanced part of the Mathematical Tripos. It was an unusually good year, the candidates including Grace and Bromwich. Dr. Maclaurin was also equal for the second Smith's prize. After graduating, he at first turned his attention to law, but before very long became professor of mathematics in the University of New Zealand. This post he left in 1907 to occupy the chair of mathematical physics at Columbia, N.Y., and two years later became president of the Massachusetts Institute of Technology. He published one legal treatise, and two on the theory of light; besides this, he contributed various papers to the Philosophical Transactions and other periodicals.

Notes.

A list of 5604 promotions in and appointments to the Civil Division of the Order of the British Empire "for services in connection with the war" was published on March 30 as a supplement to the *London Gazette*. We notice the following names of men of science and other workers known in scientific circles:—*Knight Grand Cross* (*G.B.E.*): Dr. A. E. Shipley, F.R.S., Vice-Chancellor of Cambridge University. *Knights Commanders* (*K.B.E.*): Prof. I. Bayley Balfour, F.R.S., University of Edinburgh; Prof. W. H. Bragg, F.R.S., University College, London; Dr. S. F. Harmer, F.R.S., Director of Natural History Departments, and Keeper of Zoology, British Museum; and Dr. J. E. Petavel, F.R.S., Director of the National Physical Laboratory. *Commanders* (*C.B.E.*): Prof. H. L. Callendar, F.R.S., Imperial College of Science, London; Dr. C. C. Carpenter, chairman, South Metropolitan Gas Co.; Mr. F. H. Carr, Chief Chemist, Messrs. Boots Pure Drug Stores; Prof. F. G. Donnan, F.R.S., University College, London; Mr. W. P. Elderton; Mr. A. P. M. Fleming; Prof. P. F. Frankland, F.R.S., University of Birmingham; Dr. F. W. Edridge-Green; Prof. W. A. Herdman, F.R.S., University of Liverpool; Prof. J. C. Irvine, F.R.S., University of St. Andrews; Mr. J. G. Lawn; Prof. T. M. Lowry, F.R.S.; Mr. W. Macnab; Dr. R. A. O'Brien, Director, Wellcome Physiological Research Laboratories; Mr. J. E. Sears, National Physical Laboratory; Mr. F. J. Selby, National Physical Laboratory; Dr. T. E. Stanton, F.R.S., National Physical Laboratory; Mr. G. Stubbs, Government Laboratory; Lieut. J. R. F. Wild, member of Sir E. Shackleton's Antarctic Expedition; and Dr. Dawson Williams, editor, *British Medical Journal.*

The impending retirement of Sir Napier Shaw, who has been the Director of the Meteorological Office since 1905, and as president of the International Meteorological Committee occupies a unique position, marks an epoch in the history of British meteorology. Trained primarily as a physicist, Sir Napier has been able to approach meteorological problems in a scientific spirit. His academic experience brought him into contact with younger men, and by the encouragement he extended to them he raised the level of his subject. As a consequence, there are at the present moment a greater number of men in the British Empire capable of dealing with intricate meteorological problems than in any other part of the world. A heavy responsibility rests on the authorities on whom the duty of nominating Sir Napier's successor falls. When the Meteorological Office was taken over by the Air Ministry last year the change was looked upon with grave misgivings. The near future will show whether the anxiety then felt regarding the wisdom of a step that was taken against the advice of all competent authorities is to be relieved or intensified. It would be an irretrievable calamity if administrative rather than scientific qualifications were to determine the choice. Unless the whole future of British meteorology is to be jeopardised, the Director of the Office must be a man of high scientific standing who will maintain the leading place which the Office now takes among the nations of the world. For the credit of the nation and in the interests of science we trust that the new Director will be a worthy successor of the one who has given so much scientific honour to the post.

Mr. C. E. Groves, F.R.S., for some years lecturer in chemistry at Guy's Hospital, consulting chemist to the Conservators of the River Thames, and vice-president of the Chemical Society from 1899–1902, who died on February 1, left estate of the gross value of 33,022*l.*, of which amount 20,000*l.* is left in trust for his five sisters for life, and on the death of the survivor of them 10,000*l.* to the Royal Institution for the Groves Endowment Fund for the promotion of scientific research.

Two scholarships, each of the annual value of 300*l.*, are being offered by the Grocers' Company, the object being the promotion of original research in sanitary science. In addition to the sum named, there will be an allowance to meet the cost of apparatus and other expenses in connection with the work. The scholarships will be tenable for one year, but may be extended for a second or third year under certain conditions. The elections will take place in June next, and applications have to be made, on a special form provided, before May 1 to the Clerk of the Grocers' Company, Grocers' Hall, Princes Street, E.C.2.

In spite of the fact that no regulations have been issued concerning standard time in Finland, Helsingfors time (1h. 40m. fast on Greenwich time) has been almost generally adopted in the country. The inconvenience of following a time which differs from the international zone system based upon Greenwich time was the principal cause of a proposal, made last autumn by the Geographical Society of Finland, to fix Greenwich time +2h. as the standard time of the Republic. A correspondent, "H. R.," informs us that on March 12 the President arrived at a decision in accordance with this proposal. The new standard time of Finland will be adopted by the railways from May 1, 1921, and the calendars for 1921 will introduce it from the beginning of the year. The question of adopting the twenty-four-hour day is under discussion.

The Works Council Bill has now passed into law in Germany. It provides for the formation of a works council in every works having at least twenty employees (operatives and office staff). Representation then proceeds *pro rata* up to a works employing any number. All male and female workers from the age of eighteen who are in possession of citizen rights are entitled to vote. Among the various provisions of the Act mention may be made of the obligation of the councils in assisting the management by advice with the view of obtaining the greatest economy in carrying out manufacturing operations. They must also co-operate in the application of new methods and in preventing disputes, and assist in the welfare work, etc. These provisions presuppose considerable technical and industrial knowledge on the part of the members of the council—which, it may be added, must not exceed thirty in any one establishment.

At the annual general meeting of the Chemical Society, held at Burlington House on March 25, the following were elected officers and council for the ensuing year:—*President:* Sir James J. Dobbie. *Vice-Presidents:* Prof. J. B. Cohen, Prof. F. G. Donnan, Dr. H. J. H. Fenton, Prof. S. Smiles, Prof. J. Walker, and Prof. W. P. Wynne. *Treasurer:* Dr. M. O. Forster. *Secretaries:* Dr. J. C. Philip and Dr. H. R. Le Sueur. *Foreign Secretary:* Dr. A. W. Crossley. *Ordinary Members of Council:* Prof. A. J. Allmand, Dr. E. F. Armstrong, Julian L. Baker, Francis H. Carr, Prof. A. Findlay, Prof. F. E. Francis, J. A. Gardner, Prof. J. C. Irvine, Dr. C. A. Keane, Sir Robert Robertson, Prof. J. M. Thomson, and E. W. Voelcker. It was announced that, the supplementary charter now having been granted, an extraordinary general meeting of the fellows would be held at Burlington House on April 29 at 5 p.m. to consider the alterations in the by-laws proposed by the council.

We have on several recent occasions referred to the advances which were made during the war in wireless telephony to and from aeroplanes. There is also another important use to which electric waves have been put in connection with aerial navigation, in the wireless direction-finding apparatus, which has likewise been brought to a considerable degree of perfection. An interesting demonstration of both these applications was given under the auspices of the Marconi Co. on a Hardley Page machine on March 25, when conversations were held with the Marconi establishment at Chelmsford, and messages were picked up and transmitted to the *Times* office in London. The direction-finding apparatus, which was also demonstrated, is apparently a development of the "wireless compass" used at sea, founded on the radio-goniometer of Bellini and Tosi, in which the angular relation of two coils connected respectively to two independent aerial systems at right angles is varied. By rotating a pointer carrying one of these coils a position is found where the signals received reach a maximum loudness and the direction of the incoming waves is ascertained. By plotting cross-bearings of two stations obtained in this way on a chart, the true position can be found. The Marconi form of the apparatus has a working range of 200 to 300 miles when used in conjunction with low-power coast wireless stations. The converse process was used during the war for finding the position of enemy craft from more than one home station, and it is well known that the Zeppelins used a wireless position-finder extensively for navigation during raids. The principle on which this worked is, however, believed to have been somewhat different.

The report of the Royal Commission on Decimal Coinage has just been issued. The majority report, which represents the views of about two-thirds of the members of the Commission, is not in favour of making any change in the denomination of the currency and money of account in order to place them on a decimal basis. It maintains that this decision is justified by the following considerations:—(1) In any scheme for reducing the existing system to a decimal basis the pound should be retained. (2) The pound and mil scheme is the only strongly supported scheme which complies with this condition. (3) The advantage to be gained by a change to the pound and mil scheme as regards keeping accounts is in no way commensurate with the loss of the convenience of the existing system for other purposes. (4) Grave difficulties will be created by any alteration of the penny. (5) The scheme cannot be tried as an experiment or on a voluntary basis. There are two minority reports in favour respectively of the decimalisation proposals of Lord Southwark and Lord Leverhulme. The investigation makes it clear that many of the difficulties now regarded as insuperable would disappear if our system of weights and measures were such as to familiarise the general body of the community with decimal calculation. This fact will, no doubt, stimulate the advocates of the metric system to renewed efforts to bring about this useful and necessary reform.

Dr. R. C. Smith states in the *Scientific Monthly* for February that there is in the popular mind a surprisingly large amount of misinformation and misconception concerning many forms of natural history, and this is not confined to exotic, but extends to well-known plants and animals. As instances he quotes the belief that the beaver uses its tail like a trowel; that the porcupine shoots its quills at enemies; that certain squirrels and fish fly; that snakes swallow their young in times of danger; that cats suck the breath of babies, and so on. The prevalence of these beliefs is due largely to the fact that a considerable portion of the people do little or no reading, or it is confined to trashy literature. These misconceptions are due to various causes—to hasty acceptance of the opinions of others, to mistaken observation and misinterpretation of the facts involved, but mostly to the fertility of imagination. All this points to the necessity of serious and efficient Nature-teaching in schools, by the agency of which misinformation about well-known objects of natural history can be corrected.

We congratulate the Hunterian Museum at Glasgow University on its year's record of steady progress. In the Reports on the Hunterian Collections for the Year 1918–19 just received we note especially the growth of the collections of insects of economic and sanitary importance, through the enthusiastic work of Mr. R. A. Staig. The long list of acquisitions in this department bears witness both to Mr. Staig's energy and to the admirable lines upon which he is developing the collection. The geological collections have received a valuable acquisition through the purchase of the balance of the important Leeds collections of fossil reptiles and fishes from the Oxford Clay. The honorary curator of the coin cabinet reports that the resumption of international communication has been responsible for a considerable increase in the number of requests for casts from workers abroad, and the list of consignments dispatched is eloquent at once of the world-wide fame of this museum and of what the war has meant to research workers at home and abroad.

Among early palæolithic flint implements found in the river gravels of the South of England there are certain specimens with the point slightly turned to one side. These are regarded as intermediate between the still older rostro-carinate flints and the ordinary palæoliths by Mr. J. Reid Moir, who describes seven examples in detail and discusses them in a recently published part of the Philosophical Transactions (vol. ccix., B, pp. 329–50, pls. 51–57). According to this explanation, the makers of the rostro-carinate implements eventually began to increase the efficiency of their tools by extending the ridge of the beak progressively further towards the butt end, while they chipped the edges of the great flat face until it also became a longitudinal ridge similarly extended. The rostro-carinate implement, triangular in cross-section, thus passed into the palæolithic implement of the "river-drift type," rhombic in cross-section; the two opposite flat faces of the former having been chipped away, and the two opposed great surfaces of the latter being in planes at right angles to them. As the cross-section of a rostro-carinate resembles that of a dog-fish, while the cross-section of an ordinary palæolith corresponds with that of a plaice, Sir Ray Lankester suggests that the latter should be described as platessiform. Other early palæoliths in which one face is flat may have originated from the rostro-carinate type simply by the extension of the ridge of the beak and the simultaneous thinning of the flint, thus resulting in a skate-like or batiform shape.

In the *Philippine Journal of Science* (vol. xiv., No. 4) Mr. E. D. Merrill continues his work on new or noteworthy Philippine plants. The present contribution contains descriptions of one hundred new or presumably new species, and eighteen new records for the islands. Of the nine genera which are for the first time recorded as Philippine, two are of special interest from the point of view of geographical distribution. One, Cloezia, a genus of Myrtaceæ, has hitherto been known only from New Caledonia, where it is represented by six species. The discovery of a representative in Mindanao, in forest at an altitude of 1700 metres, adds another genus to the remarkable list of genera that are known only from the Philippines and the islands to the south and south-east of the archipelago. The second, Citriobalus, is a small Australian genus of Pittosporeæ, with one species from Java, the range of which is now extended to Luzon. Another Australian species, *Ipomoea polymorpha,* previously known only from Australia and Formosa, has also been found in Luzon.

Abstracts of scientific papers, when giving full bibliographical details and fully indexed, are evidently of greater utility than mere catalogues. An excellent series of abstracts has for many years been prepared by the Chemical Society, and *Science Abstracts,* issued by the Institution of Electrical Engineers and the Physical Society, is a well-known publication. The abridgments of the Patent Office point to the use of abstracts for purposes of search. Within the last few years the question of abstracting and cataloguing scientific literature has been much discussed, and has become acute. The Mineralogical Society has, on its own initiative, made a start in this direction, and has recently issued the first number of a series of *Mineralogical Abstracts*. This will give notices of papers and books dealing with purely scientific mineralogy and crystallography, and will also direct attention to matters of mineralogical interest in original papers bearing more on petrology, ore-deposits, and economics. The work of abstracting is being carried on by voluntary helpers, but even with this help it is evident that the cost of printing will be more than a small society can bear. It is hoped, if this venture proves to be of some general use, that it may lead to an increased membership of the society.

MUCH attention has been given in recent years to the question of manufacturing alcohol within the Empire for use as motor spirit. In the current number of the Bulletin of the Imperial Institute the possibility of utilising the mowra flowers of India for the purpose is discussed. These flowers possess thick, juicy petals rich in sugar. They are used by the natives as a foodstuff, and especially for the preparation by fermentation of an alcoholic liquor called daru or mohwa spirit. A single tree will yield as much as 200–300 lb. of flowers in a year. The tree also produces a valuable oil-seed, which is exported in fairly large quantities to Europe. During the war the flowers were used in India for the production of acetone, the yield being said to be ten times as much as that obtained by distilling wood, which is the usual source of this substance. The demand for acetone in India in peace times, however, is not great, and large quantities of the flowers would be available for the manufacture of alcohol, and would appear to be an exceptionally cheap source of this material, as the yield is high compared with that from potatoes and other materials commonly used, about 90 gallons of 95 per cent. alcohol being obtainable from one ton of dried flowers. It has been estimated that in the Hyderabad State alone there are already sufficient mowra-trees for the production of 700,000 gallons of proof spirit per annum, in addition to that necessary for the local liquor requirements.

IN the Weekly Service for February 21, issued by the Ministry of Agriculture and Fisheries, there appears some interesting information on the prospective yields of cereals for the season 1919–20. From this information, obtained from the International Agricultural Institute of Rome, it seems that the world is faced with a considerable reduction in its wheat supply. In Australia the yield of wheat for 1919–20 is estimated at 54·4 per cent. of the previous year's production, and this is only 38·3 per cent. of the average of the five preceding years. Similarly, the estimated wheat yield is much lower than last year's average in the Union of South Africa, the United States of America, Rumania, and Argentina. Before the war the average exports of wheat from Russia and India were together equal to the quantity imported into the United Kingdom from all sources, but it will be some time before India can recover from the famine conditions of 1919, while it is highly probable that Russia will not rank as a wheat-exporting country for the next few years. There is, therefore, a vital need for an increased wheat production in the United Kingdom. Not only for this reason, but also because the scheme is thoroughly sound from the practical point of view, the Ministry advises the sowing of spring wheat, and gives practical advice as to varieties, soils, etc.

THE Journal of the Royal Statistical Society for January contains an interesting summary of the growth of Canada (1867–1917), "Fifty Years of Canadian Progress," by Mr. Ernest H. Godfrey, of the Dominion Bureau of Statistics, Ottawa. While Prince Edward Island and the North-West Territories show an absolute decline in population in the period 1871–1911, the total population was nearly doubled, and that of Manitoba increased from 25,228 to 455,614. More than a third of a million immigrants entered Canada in each of the three years 1912–13–14. The acreage and yield of wheat were more than doubled in the decade 1900–10, those of oats increased by two-thirds, and these rates of development were maintained until 1917. In 1870 Ontario produced 85 per cent. of the wheat, 82 per cent. of the barley, and 52 per cent. of the oats of the Dominion; since 1900 the main farm crops have been obtained further west, Saskatchewan producing in 1917 56 per cent. of the wheat, 28 per cent. of the barley, and 34 per cent. of the oats. While the numbers of sheep have steadily declined (1871–1911), those of horses have doubled and of cattle have increased by 50 per cent. Canadian cheese factories produced annually from 1½ to nearly 2 million cwt. (1893–1917), nearly all of which was exported to the United Kingdom. In 1867 there were 2288 miles of railway line; in 1881, 7331; and in 1917, 38,604. The mineral census of 1911 was of so different a character from those of earlier years that it is not possible to quote details of the progress in mineral wealth. The paper is worthy of close attention by all who are interested in Canada.

GEOGRAPHERS are not likely to overlook the continuous exploration and illustration of Alaska by the officers of the United States Geological Survey, further evidence of which is seen in Bulletins 683 and 687, dated 1918 and 1919 respectively. The former contains a number of new maps, where much still remains a blank, of country stretching in from the coast north and west of the Lower Yukon River. The latter provides excellent photographic views, notably plates v. and vii., of the Kantishna region, north of Mount McKinley, where the only population consists of some forty whites engaged in mining.

IT is a pleasure in these times to handle and read so well printed a report as that which inaugurates the "Scientific Survey of Porto Rico and the Virgin Islands" (vol. i., part 1, issued by the New York Academy of Sciences, 1919). The origin of the survey of this outpost-island of the United States is given by Mr. N. L. Britton, and Mr. C. P. Berkey furnishes an introduction to the general geology. The rocks of Porto Rico divide themselves into an older series, mainly volcanic, which is regarded as Cretaceous or a little earlier, and a sedimentary Cainozoic group, determined by marine fossils to be of Eocene, Oligocene, and Miocene age, Oligocene beds largely predominating. Though it is not mentioned on the cover of the part, a good map of the island, by Messrs. Reeds and Briesemeister, faces p. 30. The scale is 1 : 950,400, and red contours are sketched at 100 ft., 500 ft., 1000 ft., and 1500 ft. In his detailed account of the geology of the San Juan district Mr. Douglas R. Semmes describes the very interesting and very annoying topography of the Tertiary limestone belt, where "pepinos"—we prefer this term, meaning "cucumbers," to Mr. Berkey's "haystack hills" adopted in the paper—give rise to a remarkably broken country. This topography is due to the irregular falling-in of waterways in the Cainozoic limestone, complicated by the occurrence of beds of shale. In the petrographic section we welcome the appearance of Vogelsang's term "vitrophyre"; but the German spelling that is retained, even in a plural, which is written "vitrophyrs," makes us fear that this useful word is here limited as Rosenbusch desired.

Aerial navigation has become of such vast importance that any aid which meteorology can afford is welcomed, while, on the other hand, the meteorologist looks with much expectation to the airman for observations which may advance our knowledge of the general movements of the atmosphere. The Meteorological Office has just issued "An Analysis of Cloud Distribution at Aberdeen during the Years 1916–18" (Professional Notes No. 9, price 4*d.* net). The analysis is by Mr. G. A. Clarke, assistant at Aberdeen Observatory. It is practically a first effort at averaging the number of days in each month on which certain cloud characteristics are predominant, and from this deducing by the estimated average height of the cloud the occasions when air was cloud-free below certain heights. The number of occasions upon which flying would have been handicapped on account of the lowness of the cloud is 31 per cent. of the total, and of the remainder rather more than one-third show no cloud below 7000 ft. The weakness of the analysis is that the cloud-heights have been worked on average results deduced from altogether different observations. It is recognised by meteorologists not only that the heights of clouds may vary at different stations, but also that they are subject to diurnal and seasonal variations.

In a paper on operating a by-product producer-gas plant for power and heating, read recently at the Institution of Electrical Engineers, Mr. W. H. Patchell gives particulars of the running of a plant belonging to the Hoffmann Manufacturing Co., Ltd. The gas plant is on the Lymn system, and the power units consist of four-cylinder horizontal Premier engines of about 500 brake-horse-power at 190 revs. per min. Each gas engine is fitted with an exhaust boiler, and the boilers were installed with water-heaters. The dynamos were supplied by Messrs. Crompton, and are open type direct-current shunt-wound interpole 360-kw. machines running at 190 revs. per min.; the first two machines work at 110 volts, and in the second instalment of plant, machines working at 220 volts are used. The figures obtained for a period of six months' running show a consumption of 1·51 lb. of coal per kw.-hour, and a thermal efficiency of 19·9 per cent. on the units delivered to the feeders. The best figure quoted by Mr. David Wilson (Technical Adviser to the Controller of Coal Mines) for electric power stations in the South of England is a consumption of 2·32 lb. of coal per unit and a thermal efficiency of 13·05 per cent. The best station in the Northumberland district gave 1·80 lb. of coal per unit and a thermal efficiency of 18 per cent. Mr. Patchell considers that the large-cylinder high-power gas engine will be developed in this country as it has been abroad—an opinion in which he appears to differ from some other gas-engine authorities.

A paper read to the North-East Coast Institution of Engineers and Shipbuilders on March 19 by Dr. W. H. Hatfield, of the Brown-Firth Laboratories, and Mr. H. M. Duncan, of Messrs. C. A. Parsons and Co.'s Research Laboratory, deals with the mechanical properties of turbine steels. Unfortunately, the authors were unable to obtain specimens of turbine steel which had done good service in severely stressed parts, and a standard with which they could compare other steels was therefore lacking, but the conclusion is reached that design has probably more to do with the life of turbine parts than the quality of the steel. One disc which failed in practice, however, proved to be weak when tested in a radial direction, and the defects of structure are illustrated by means of photomicrographs. The paper contains a number of tests by different methods, the conclusions as to the relative value of impact, bending, hardness, and tensile tests being, in the main, the same as those reached by Dr. Hatfield in his paper read before the Institution of Mechanical Engineers. An investigation of the Sankey test is included, the relation between the length, diameter, and resistance of the test piece being examined. A formula is given which yields a rough approximation to the values which would be obtained under standard conditions. Formulæ are also given for the Stanton repeated impact test, and the data collected should be of interest to engineers who are concerned with testing.

Some interesting particulars regarding the use of mechanical reduction gears between the turbines and the propeller in the Royal Navy were given in a paper read at the recent meeting of the Institution of Naval Architects by Eng.-Comdr. H. B. Tostevin. By 1916 it was considered that enough progress had been made to warrant a complete change-over to this type of driving, and at present there are installed or on order 612 sets of gears of a total horse-power of 7,828,000. The largest set transmits 36,000 shaft-horse-power, and there are four sets on this ship, totalling 144,000 h.p. In all naval work the turbine spindles, pinions, and gear-wheels are supported on rigid bearings, and the alignment is determined by accurate machine work in boring the gear housings and fitting the bearings. In general, a gearing ratio of 8 or 9 to 1 is not exceeded in naval practice of moderate and high power. Of the 556 sets in service, some extending up to nearly six years, it has only been necessary to remove three for refit due to misalignment; no actual breakdown occurred, and the gears, after dressing up, were afterwards re-utilised. Two cases of fractured teeth occurred; the broken or cracked portions were removed and the damaged teeth were smoothed up. There is a great saving in the blading of the turbine by the adoption of mechanical gearing, amounting in the case of a destroyer to 70,000 ft. of blading in a direct drive, against 7720 ft. in the geared drive. The increase in efficiency is 16·1, 17, and 20 per cent. respectively for light cruisers, flotilla leaders, and torpedo-boat destroyers at full power; at one-fifth power the increases in efficiency are 16·5, 20, and 20 per cent. respectively.

Messrs. Thomas Murby and Co. are publishing shortly two books likely to interest geological readers, viz. "An Introduction to Palæontology," by Dr. A. Morley Davies, and "Petrographic Methods and Calculations," by Dr. A. Holmes. In the first-named work the "type-system" of Huxley is applied. A limited number of fossil species are described in detail, the relation of the structure to the animal's mode of life being pointed out, as well as the effects of fossilisation. Each such description is followed by a general account of the group of which the "type" is representative. The volume will contain appendices dealing with rules of nomenclature and methods of extracting and preserving fossils. In Dr. Holmes's volume the following subjects receive attention: Specific gravity and porosity of rocks—examination of crushed rocks and loose sediments—mineral analyses by heavy liquid, magnetic, and electrostatic methods—mechanical analysis of sands—preparation of thin sections and their examination by staining, micro-chemical, and other methods—chemical analyses of rocks and their interpretation—representation of analyses by diagrams—suggestions for the description of rocks.

Messrs. W. Heffer and Sons, Ltd., Cambridge, have just circulated a miscellaneous catalogue (No. 186) of secondhand books which will doubtless be of service to many readers of Nature. The more strictly scientific portion contains 100 items ranging over most of the branches of scientific knowledge; a lengthier section gives particulars of works on folklore, mythology, psychical research, comparative religions, etc. The Sanskrit collection of the late Dr. A. F. R. Hoernle, comprising about 400 volumes, is also listed. The catalogue may be had upon application.

Readers of Nature interested in biography and desirous of obtaining books relating to this subject at small cost should obtain a copy of Catalogue No. 400 just issued by Mr. F. Edwards, 83 High Street, Marylebone, W.1. The list is not particularly strong in science, but it contains lives of Charles Darwin, Sir Joseph Banks, J. J. Audubon, Thomas Bewick, Sir Colin Scott-Moncrieff, and others. There is also a section of works on genealogy and family history. The catalogue will be sent on request.

Our Astronomical Column.

April Meteors.—Of April generally and its special meteoric display it can scarcely be said that they often possess features of striking interest from a spectator's point of view. The fact is that the spring months are usually all deficient in abnormal phenomena of this kind, and observers are sometimes sadly disappointed with the result of their observations; for if meteors from Lyra are absent or few, there is little else to engage the student, as meteors may fall not more abundantly than three or four in an hour.

There are periodic returns of grandeur attached to the Lyrids, but the uncertainty of the periodic time renders it a non-predictive feature. Hence the observer must needs take up his stand with a very doubtful prospect before him.

But the stream of Lyrid meteors has important historical associations, and the shower can boast of a known cometary parentage. These facts, combined with the possibility of a bright and abundant display in any year, lure observers to look for it with an interest and anticipation sometimes amply justified.

Spectrum of η Argûs.—As Mr. Baxandall and Miss Cannon suspected changes in the spectrum of this interesting star, Dr. Joseph Lunt took two photographs in February and April, 1919. Each was exposed on three nights with a total exposure of nine hours. The spectrum consists mainly of bright lines; there are dark lines, but they cannot be identified with known lines, and may be merely interspaces between bright bands. The results for radial motion differ according to the lines employed. The enhanced iron lines give −30·7 and −28·2 km./sec. from the two plates. The chromium lines are in fair agreement with this, but the hydrogen bright lines give +46·5 and +48·7 km./sec., a difference of 77 km./sec. from the other lines. On the other hand, hydrogen dark lines give −19 excluding H_β, or −33 including it.

Dr. Lunt suggests in explanation the settling down of an extensive outer hydrogen atmosphere on to the central body. He refers to Mr. Innes's discovery of a faint companion, and notes that hitherto no certain sign of variable radial velocity has been detected. He emphasises the importance of keeping the star under constant watch, both visual and spectroscopic, as the light curve gives expectation of another brightening about the present time. The star is a curious link between novæ and variables, Miss Cannon noting a strong resemblance between its bright-line spectrum and that of Nova Aurigæ on 1892 February 17 (Monthly Notices, vol. lxxix.).

Infra-red Spectra of Nebulæ.—Investigations are being carried out at the Lick Observatory by Dr. K. Burns with the object of securing photographic plates of great sensitivity to infra-red radiations, and some plates prepared by him have been utilised by Mr. W. H. Wright for exploring the spectra of nebulæ in this region. In the Publications of the Astronomical Society of the Pacific, No. 185, Mr. Wright gives an account of his preliminary attempts in this direction, with the results obtained in the case of the planetary nebula N.G.C. 7027. The 36-in. refractor of the Lick Observatory was used with a single-prism spectrograph giving the rather small dispersion of 1 mm. to about 600 A.U. on the plate. The focus was not good in the region required, but fair definition was obtained between λ 6700 and λ 8500, and his photographs show four lines in the extreme red not previously reported. The corrected wave-lengths are given as approximately 7009, 7065, 7138, and 7325, and in addition to these lines there are others at λ 6678 and λ 6730 which have been measured previously with other apparatus.